

# **The Federal Environmental Protection Authority**



## **Environmental impact assessment guidelines on Forestry**

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This guidelines is still under development and shall be binding after consensus is reached between the Environmental Protection Authority and the Environmental Units of Competent Sectoral Agencies

**2004  
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Ethiopia**

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## Introduction

These guidelines cover agroforestry, tree planting and natural forest management that are generally components of rural development projects. The guidelines do not consider forest products processing projects.

The Guidelines aim to assist in developing forestry projects that can address the themes of sustainable development. They highlight major issues and potential impacts that should be taken into account during the preparation and assessment phases. The appropriate enhancement and mitigation measures should be integrated as early as possible, preferably in the project design.

### 1. Major Types of Intervention in the Forestry Sub-Sector

Forestry comprise various activities, ranging from tree planting to forest products harvesting, as well as biodiversity conservation and watershed management. These guidelines focus on the activities inducing the most important environmental and social impacts, particularly forest management activities carried out in the field to harvest trees on a commercial basis.

Globally, there are three categories of forestry activities, namely:

- agro forestry;
- tree plantations;
- natural forest management.

Agro forestry can be defined as land-use systems or technologies where woody perennials (trees, shrubs, palms, etc.) are used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. Agro forestry projects involve ecological and economical interactions between the different project components and tend to enhance agricultural/livestock production as well as to contribute to soil conservation.

Tree plantation projects aim to grow trees for wood production and/or for provision of environmental services. Tree plantations for production can vary from large

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commercial plantations to small community or private woodlots. Plantation products include timber, poles, pulpwood, fuel wood, and non-timber products such as fruits, forage and medicine. Tree plantation projects for providing environmental services consist in planting trees for preserving soils, preventing desertification, producing shade and wind breaking.

Natural forest management projects have the same dual purpose: production of timber and other forest products and provision of environmental services (watershed protection and biodiversity conservation). In this case, forest regeneration is ensured by natural mechanisms that can be enhanced by human interventions such as silvicultural treatments and the use of fire as a management tool, where conditions are favourable such as in Southern African countries.

### **2. Specific Characteristics of a Forestry Project**

The description and justification of a forestry project shall at least cover the following elements:

- Project location and siting, including a location map.
- History of forest management in the area.
- Land tenure and uses.
- Affected groups (directly and indirectly).
- Existing and proposed location of human settlements and public services such as health centres and accident and emergency units.
- Natural and human resources requirements.
- Socio-cultural factors or constraints, such as customs and beliefs.
- Project characteristics: planting and/or forest management activities, harvesting or protection methods, expected production, etc.
- Targeted tree species and justification.
- Use of fertilisers and chemicals.
- Fire and pest management plan.

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- Forest products transportation.
- Forest products marketing methods.
- Construction activities (land preparation, use of heavy machinery, forest roads, facilities such as workers' camps, etc.).
- Anticipated liquid, solid (including waste) and gaseous emissions, and sources of nuisances (at construction and operation stages).
- Investment schedules and costs.
- Maintenance works and associated costs.
- Consultation approaches and participation mechanisms.

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### 3. Major Issues Related to a Forestry Project

The major issues related to forestry projects can be summarised as follows:

Crosscutting Theme	Major Issues	Relevant or not
Economy	<ul style="list-style-type: none"> <li>• Economic activity, employment and incomes.</li> <li>• Operations profitability.</li> <li>• Access to benefits, particularly for the poor and other vulnerable groups.</li> <li>• Skills, knowledge and attitude towards forest management.</li> <li>• Availability of and access to infrastructures and services.</li> <li>• Access and ownership of forest products.</li> </ul>	
Ecology	<ul style="list-style-type: none"> <li>• Protection of soils.</li> <li>• Water management.</li> <li>• Wildlife habitat and biodiversity.</li> <li>• Tree species selection.*</li> <li>• Forest products management.*</li> <li>• Vegetation coverage and diversity.**</li> <li>• Climate change.</li> <li>• Waste management.**</li> </ul>	
Population	<ul style="list-style-type: none"> <li>• Migration</li> <li>• Availability of and use of forest products.</li> <li>• Traditional forest product collection activities and local customs.</li> <li>• Land uses.</li> <li>• Fire risk.</li> <li>• Quality of life.</li> </ul>	
Health Outcomes	<ul style="list-style-type: none"> <li>• Communicable diseases such as trypanosomiasis, yellow fever and other zoonoses.</li> <li>• Injuries.</li> <li>• Pesticides management.*</li> <li>• Malnutrition.*</li> </ul>	
Gender	<ul style="list-style-type: none"> <li>• Women's workload.</li> <li>• Control over the land and land proceeds.</li> <li>• Income-generating activities for women.</li> <li>• Access of women to new facilities and services.</li> <li>• Women's specific demands.</li> <li>• Involvement of women in decision-making processes.</li> </ul>	
Participation	<ul style="list-style-type: none"> <li>• Participation of affected groups in consultations.</li> <li>• Organisation of forestry management.</li> </ul>	

\* Specific to tree plantations

\*\* Specific to natural forest management

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### Potential Impacts, Enhancement and Mitigation Measures

The potential impacts outlined below are presented by crosscutting theme (one table per theme) to clearly identify the potential interactions between a forestry project and a specific transversal issue.

#### 4.1 Economy

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Economy	<ul style="list-style-type: none"> <li>• Increased forest products yields, generating additional revenues.</li> <li>• Diversification of income-generating activities due to a better access to forest products.</li> <li>• Increase in local development and employment.</li> <li>• Substitution of tree imports by local production.*</li> <li>• Increase in forest products exports.</li> <li>• Constraints for producers to meet profitability objectives.</li> <li>• Exclusion of specific groups from participating in forestry projects.</li> <li>• Losses for affected people who cannot maintain forest products collection activities.</li> <li>• Disruption of economic activities such as hunting and tourism in protected forests.**</li> <li>• Decrease in forest products prices.</li> </ul>	<ul style="list-style-type: none"> <li>• Give preference to local employment (men and women) and local inputs (food, basic material) to the extent possible.</li> <li>• Select tree production on the basis of commercial comparative advantages, biophysical potentialities as well as preferences of the local population (men and women).</li> <li>• Ensure that commercial channels exist to sell forest products at competitive prices.</li> <li>• Base profitability projections on conservative revenue assumptions.</li> <li>• Identify why specific groups are not benefiting from the project and adopt corrective measures as required.</li> <li>• Ensure that a fair share of royalties from forest harvesting is distributed to local communities, when forests are publicly owned.</li> <li>• Create a Community Development Fund to manage taxes and other revenues coming from forest products to maintain infrastructures.</li> <li>• Offer alternative income opportunities to men and women having a limited access to or losing productive means.</li> <li>• Establish appropriate compensation mechanisms, recognising income and asset losses.</li> <li>• Ensure that the poor and other vulnerable groups can continue to satisfy their basic needs in forest products.</li> </ul>

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### Economy cont...

Information, education and communication	<ul style="list-style-type: none"> <li>• Development of skills in forestry management.</li> <li>• Increased awareness about forestry as a component of rural development planning.</li> <li>• Exclusion of specific groups from the project allocation process due to a lack of knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• Assist groups of individuals (men and women) who may lack the capacity to apply for participating in the project, if they want to.</li> <li>• Develop and implement a literacy program especially aimed at poor people and women.</li> <li>• Provide producers, men and women, with the training required to maximise production and revenues (forestry techniques, management, commercialisation).</li> <li>• Ensure that forestry extension services provide additional training to producers who do not have all the skills required due to a lack of opportunities (ex: landless people).</li> <li>• Ensure that forestry extension services offered to men and women are designed in a gender sensitive way.</li> <li>• Inform the local population on potential project benefits for the community and identify individual behaviours that would contribute to achieve those benefits.</li> </ul>
Access to infrastructures and services	<ul style="list-style-type: none"> <li>• Improved access to tree production inputs.</li> <li>• Development of commercial services for forest products.</li> <li>• Improvement of transportation infrastructures in remote forested areas.**</li> <li>• Degradation of existing public roads by heavy timber loads.**</li> </ul>	<ul style="list-style-type: none"> <li>• Involve the population (men and women) in the management of new and improved services to ensure their sustainability.</li> <li>• Consider the establishment of social facilities such as schools and health centres in labour camps.</li> <li>• Provide logistical support to producers (men and women) to organise activities complementary to tree production (input purchase, technology, credit, etc.).</li> <li>• Regulate timber loads size for transportation.</li> <li>• Establish road taxes on timber loads to finance road maintenance.</li> </ul>

\* Specific to tree plantations

\*\* Specific to natural forest management

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### 4.2 Ecology

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Air	<ul style="list-style-type: none"> <li>• Degradation of air quality by dust and vehicles emissions during access roads construction and forest products transport.</li> <li>• Degradation of air quality by fire (site preparation).*</li> <li>• Protection against wind and dust dispersion.*</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain vehicles and machinery in good condition in order to minimise gas emissions.</li> <li>• Forbid the use of fire for site preparation in dry season.*</li> <li>• Use appropriate means for minimising dust dispersion during site preparation, particularly means involving labour intensive methods.*</li> </ul> <p>Give preference to wind-resistant species.*</p>
Water	<p>Change in local hydrologic conditions by altering water flow, which can affect groundwater recharge.</p> <p>Contamination of water quality by hazardous materials (hydrocarbons, chemical products, etc.), leaks and spills.</p> <p>Degradation of water quality due to soil erosion and use of fertilisers and pesticides.*</p> <p>Regulation of surface water flow and improvement of water quality.*</p> <p>Flood regulation.*</p> <p>Watercourse obstruction and soil compaction causing localized ponding and stagnation.**</p>	<p>Manage surface water in order to minimise the impacts downstream of the project area.</p> <p>Maintain motorised equipment in good condition to avoid leaks and discharge of hazardous materials.</p> <p>Take all precautions during the refuelling of motorised equipment.</p> <p>Provide storage and handling facilities for waste collection and disposal.</p> <p>Discourage the use of pesticides and chemical fertilisers and favour the use of alternative biological and mechanical means.*</p> <p>Train workers on the safe use of pesticides and chemical fertilisers.*</p> <p>Avoid clearing vegetation along water bodies.**</p> <p>Do not hamper natural drainage and runoff.**</p>

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Ecology cont...

<p>Soil</p>	<p>Increased soil fertility due to the establishment of vegetation cover.*          Soil stabilisation.*          Following site preparation and harvesting, runoff erosion resulting in sedimentation problems.          Loss of organic matter by removal of vegetation (site preparation and harvesting).          Contamination of soils from spilling of hazardous materials.          Soil compaction, erosion, leaching and increased temperature resulting from harvesting operations.          Development of hardpans and laterization (site preparation).*          In semiarid areas, depletion of soil moisture and lowering of water table in plantation area.*          Change in soil stability by roadcuts on sloping soils resulting in landslides.**</p>	<p>Avoid areas sensitive to erosion.          Minimise land-clearing areas and clearly identify the areas that should not be harvested.          Ensure a safe management of hazardous materials (hydrocarbons, chemical products, etc.).          Avoid whole-tree harvesting.          Locate log-landing area in well drained and easily accessible areas downslope.          Restrict land clearing and harvesting to dry periods.          Avoid clear cutting; instead, use a rotation system cutting an annual quota determined on a sustainable basis.          After harvesting, stabilise the soils in order to reduce potential erosion.          Give preference to animal traction rather than machinery.          Minimise the construction of access roads and skidding trails for harvesting.          Replant as soon as possible after land clearing.*          Give preference to fast-growing and nitrogen-fixing species for protecting soils.*          Encourage rapid forest regeneration.**</p>
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Ecology cont....

<p>Ecosystems</p>	<p>Encroachment into ecologically sensitive and protected areas in order to establish new tree plantations.*          Destruction of natural forests for the establishment of commercial tree plantations (decrease in biodiversity).*          Increased sedimentation in streams.*          Creation of habitats favourable to organisms that could be harmful for the vegetation cover and/or favourable to diseases vectors due to the establishment of intensive monocultures.*          Degradation of ecologically sensitive areas due to bad forest management practices.**          Increased access to forest areas.**</p>	<p>Design tree plantation projects taking into account ecologically sensitive areas.*          Forbid land clearing for the establishment of tree plantations in ecologically sensitive and protected areas.*          Establish tree plantations in degraded sites or sites of low diversity.*          Maintain a strip vegetation along water bodies.*          Avoid earthfill dams across streams as crossings.*          Install sediments traps in streams.*          Intensify the management of existing natural forests in order to discourage extensive tree plantations occupying large areas.*          Avoid single-species plantations and favour multipurpose trees.*          Develop and implement proper tree plantations management plans.*          . Develop and implement proper forest management plans.**          Limit access into the forest areas managed for production or protection.**</p>
<p>Flora</p>	<p>Creation of carbon sink due to increased vegetation cover.*          Environmental degradation due to the selection of trees and shrubs not well adapted to site conditions.*          Loss of medicinal plants.*          Loss of biodiversity due to the introduction of exotic species and monoculture plantations.*          Increase in harmful species.*          Overexploitation of forest resources and degradation of the resource base.**          Damages to non-target species.**          Reduction in the biodiversity due to selective logging.**</p>	<p>. When selecting species, give preference to indigenous species or to those well adapted to the site characteristics.*          Discourage or forbid the introduction of exotic species without comprehensive study.*          Increase the number of species planted and avoid monocultures over large areas.*          Manage forest resources on a sustainable basis (restrictions, annual allowable cut, compulsory permits, regulations, traditional practices).**          Develop new markets for non-target species.**          Assess forest resources stocks, develop forest management plans and implement international agreements over resources allocation.**          Ensure proper regeneration for all species present in the area.**          Take into account wildlife migratory routes.          Restrict land clearing to tree plantation areas.*</p>

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Ecology cont....

Fauna	<p>Creation of new wildlife habitats.*</p> <p>Degradation of terrestrial and aquatic wildlife habitats through land clearing for the establishment of tree plantations and forest logging.*</p> <p>Derangement of wildlife due to bad practices (poaching, roading, harvesting, etc.).**</p>	<ul style="list-style-type: none"> <li>• Plan harvesting operations taking into account the presence of wildlife habitats.**</li> <li>• Regulate and monitor management practices. **</li> <li>• Forbid non-resident workers from hunting and fishing.</li> </ul>
Natural and cultural heritage	<ul style="list-style-type: none"> <li>• Loss of cultural, religious and historical heritage as well as aesthetic resources.</li> <li>• Breach in agreements with traditional authorities concerning cultural, religious, historical and aesthetic sites and resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Before site preparation, carry out an archaeological search in the potential areas containing artefacts and preserve discovered artefacts.</li> <li>• Negotiate with traditional authorities the preservation of important cultural, religious, historical and aesthetic sites and resources and agree on potential compensation for the communities.</li> <li>• During site preparation, ensure an archaeological surveillance in potential areas containing artefacts and in case of a discovery, advise the concerned authorities.</li> <li>• Involve traditional authorities in monitoring cultural, religious, historical and aesthetic sites and resources during site preparation activities.</li> </ul>

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### 4.3 Population

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Demographic trends	<ul style="list-style-type: none"> <li>• Temporary imbalance between men and women due to male workers, which can lead to an increase in sexually transmitted diseases.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish labour camps at a reasonable distance from villages.</li> <li>• Whenever possible employ women or married men with nearby families.</li> <li>• Assist non-resident workers in order to encourage their families to join them.</li> </ul>
Migration and resettlement	<ul style="list-style-type: none"> <li>• Inappropriate living conditions for non-resident workers and their families.</li> </ul>	<ul style="list-style-type: none"> <li>• Plan adequate settlement areas with appropriate housing and services (water, sanitation, food supply) for non-resident workers and their families.</li> </ul>
Natural resources and land management	<ul style="list-style-type: none"> <li>• Increase in the production of forest products (fodder, fuelwood, etc.).</li> <li>• More efficient use of forest resources through improved natural forests management practices.**</li> <li>• Incompatible land uses leading to social conflicts.</li> <li>• Loss of territory for some groups, particularly farmers and livestock herders.</li> <li>• Reduction in the quantity of water available for various uses.</li> <li>• Increased risk of fire in arid areas.*</li> <li>• Risks of forest fires due to the presence of workers and machinery.**</li> <li>• Social conflicts over forest products ownership.</li> <li>• Destruction of food sources and medicinal plants.**</li> </ul>	<ul style="list-style-type: none"> <li>• Design the project and coordinate work with all land users (fuelwood collectors, farmers, livestock herders, etc.).</li> <li>• Establish tree nurseries and plantations taking into consideration water needs of all types of users.*</li> <li>• Choose low water demanding species.*</li> <li>• Develop and implement appropriate fire control measures.</li> <li>• Develop and implement proper management plans taking into account the needs of local populations.</li> <li>• Clearly define forest products ownership in consultation with affected men and women.</li> <li>• Develop alternative grazing areas.*</li> </ul> <p>Plan for recuperating forest products during land clearing and identify mechanisms to distribute the products to the local population.*</p> <p>Protect medicinal plants.**</p>

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Population cont...

Quality of life	<ul style="list-style-type: none"> <li>• Improvement in quality of life due to new economic opportunities.</li> <li>• Degradation of the quality of life due to nuisances such as noise, dust and traffic related to the project.</li> <li>• Change in local customs (means of subsistence and traditional forest products collecting activities).</li> <li>• Change in livelihood for subsistence farmers, hunters and fuelwood sellers.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a formal consultation mechanism with local authorities to discuss issues disturbing inhabitants and to find solutions satisfying all parties.</li> <li>• Train workers in the field of environmental protection.</li> <li>• Implement an adequate communication plan to inform the local population on work to come and opportunities for them.</li> <li>• Involve local authorities in monitoring implementation activities, ensuring a good representation of men and women.</li> <li>• Ensure appropriate compensation to men and women whose livelihood is adversely affected.</li> </ul>
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\* Specific to tree plantations

\*\* Specific to natural forest management



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### 4.4 Health Outcomes

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Communicable diseases	<p>Malaria, yellow fever, trypanosomiasis and other zoonoses and acute viral infections such as Ebola Fever.</p> <p>HIV and other sexually transmissible diseases due to non-resident workers and migrants.</p>	<p>Distribute impregnated bednets and insect repellents.</p> <p>Control animal populations associated with disease reservoirs.</p> <p>Use tsetse fly traps and associated environmental management techniques.</p> <p>Focal pesticide spraying.</p> <p>Provide vaccination.</p> <p>Implement HIV/AIDS prophylaxis for men and women, through appropriate health promotion as well as wide distribution and use of condoms; employment opportunities for project-affected women; provision of family accommodation for non-resident workers.</p> <p>Improve access to medical diagnosis and treatment.</p>
Non-communicable diseases	<p>Pesticide poisoning.*</p>	<p>Comply with regulations on pesticides import and management.*</p> <p>Safely manage pesticide storage (appropriate containers, labelling, locked facilities) and use (appropriate training for all family members, masks and gloves).*</p>
Malnutrition	<p>Decrease in wild food sources, jeopardising food security, due to a loss of common property resources.</p> <p>Loss of fodder.</p>	<p>Provide alternative food and fuelwood sources.</p> <p>Maintain or replace grazing reserves.</p>
Injuries	<p>Crushing and cutting injuries.</p> <p>Snake bites.</p>	<p>Improve occupational health and safety.</p> <p>Include traffic calming devices on access roads.</p>

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Health Outcomes cont...

Psychosocial disorders and well-being	Stress and anxiety associated with involuntary resettlement, rapid social change, loss of traditional authority, loss of spiritual assets, uncertainty and locus of control, severance, exclusion, and marginalisation, gender related problems and domestic disputes leading to suicide, physical and mental abuse, child marriage, labour and sale, and communal violence. Well-being associated with improved income, stability, work opportunities, settlements, health, empowerment, education and training.	Refer to measures proposed under other crosscutting themes as those address many causes of psychosocial disorders and factors contributing to well-being.
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### 4.5 Gender

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Division of labour (paid and unpaid work)	<ul style="list-style-type: none"> <li>• Reduction in time spent to collect fuelwood as sources are closer.*</li> <li>• Increased time spent by children, women and men on natural resources management, including nursery work.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish rules among producers to limit child work.</li> <li>• Provide technologies to both women and men to reduce time spent on natural resources management.</li> <li>• Build on the respective knowledge and experience of women and men in tree production to reduce management time and efforts.</li> </ul>
Income-generating activities (money or kind)	<ul style="list-style-type: none"> <li>• Additional sources of income for women when paid for nursery work or allowed to collect and to sell forest products.</li> <li>• Decreased revenues for women when collecting and selling activities are restricted.</li> </ul>	<p>Ensure that all workers (women and men) get remunerated for their work or are entitled to forest products in compensation.</p> <ul style="list-style-type: none"> <li>• Ensure that women are directly paid for their work, avoiding intermediaries.</li> </ul> <p>Provide appropriate compensation or income generating alternatives to both women and men adversely affected by the project.</p>
Access to and control over productive factors	<ul style="list-style-type: none"> <li>• Exclusion of women when the selection of project beneficiaries is based on land ownership.</li> <li>• Loss of control over forest products when women are not involved in decision-making processes.</li> <li>• Selected species do not respond to women priority needs.*</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that project promoters do not reinforce cultural barriers affecting negatively women.</li> <li>• Establish, and change if required, the selection criteria to ensure that women have a greater access to and control over forestry resources.</li> <li>• Provide women with an opportunity to make their needs known to project decision-makers.</li> <li>• Recognise the specific demands and skills of women in forestry, based on their experience in caring for trees as well as in collecting and using forest products.</li> <li>• Consider targeting women beneficiaries when inequities exist and persist.</li> </ul>
Involvement in societal organisation	<ul style="list-style-type: none"> <li>• Involvement of women in decisions related to forestry management and tree production.</li> <li>• Women get organised to obtain training in forestry management adapted to their specific needs.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish management committees involving women and men in the development and monitoring of forest management plans. If cultural barriers do not allow mixed structures, develop independent structures for women.</li> <li>• Facilitate the creation of women groups when women express an interest in being better organised and represented.</li> </ul>

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### 6 Participation

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Consultations	<ul style="list-style-type: none"> <li>• Integration of men's and women's concerns into the project design.</li> <li>• Increased support for the project among affected populations.</li> <li>• Exclusion of specific groups from consultations, particularly women.</li> </ul>	<ul style="list-style-type: none"> <li>• Consult affected men and women at all phases of the project.</li> <li>• Provide the opportunity to all affected groups (men and women) to participate in consultations by offering adapted consultation mechanisms.</li> <li>• Use consultations to determine traditional patterns of right and responsibilities concerning forestry and to identify ways to increase the involvement of excluded groups (men and women).</li> <li>• Inform consulted men and women on how their concerns were taken into account.</li> </ul>
Civil society strengthening	<ul style="list-style-type: none"> <li>• Creation of community-based organisations in forestry management.</li> <li>• Expansion of the civil society organisation (CSO) network working on environmental protection.</li> <li>• Lack of collaboration with existing CSOs working on forestry issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that men and women have the opportunity to organise themselves in groups representing their interests.</li> <li>• Facilitate the participation of existing CSOs in the project taking into account their respective intervention priorities and strengths.</li> </ul>

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\*\* Specific to natural forest management

## 5. External Factors

The major external factors that may influence the outcomes of a forestry project are the following:

- **Fire**

In dry areas, such as semiarid areas, fire can represent a serious threat to the conservation of tree plantations and natural forests. To reduce fire risks, proper protection measures against fire, such as fire protection plans, shall be implemented.

- **Insect epidemics and tree diseases**

Monocultures can be quite sensitive to insect epidemics and tree diseases, due to their lack of diversity and sometimes to low resistance of selected species. This is why it might be preferable to choose indigenous species rather than exotic species and to plant various species in a same area.

- **Conversion of natural forests to other uses**

The conversion of natural forests for farming, livestock grazing, urban development etc. leads to the destruction of forests and to the loss of their ecological and social functions. The development and implementation of proper land use plans taking into account the needs of all groups of the population can help to ensure the sustainable conservation of forests and meanwhile their socio-economic development.

- **Social instability**

The emergence of community violence, vandalism, civil war, border raids and boundary disputes are phenomena that generate social instability and can lead to migration, disruption of the food chain, injuries, epidemics and mortality. Good governance and poverty alleviation policies are means to prevent social instability.

## 6. Hazard Management

The main hazards associated with forestry projects are the following:

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For tree plantations:

- **Pesticides misuse**, resulting in acute and chronic poisoning of people and wildlife, as well as bioaccumulation.
- **Fire hazard**, due to the build up of organic matter under tree plantations.

For natural forest management:

- **Work accidents**, resulting in injuries (burns, explosions) and human losses.

For all forestry projects:

- **Natural disease reservoirs** in animal populations such as monkeys and bushbucks.

In order to prevent or minimise these hazards, appropriate risk management measures shall be designed and implemented.

## 7. Environmental Monitoring

The following tables present the potential indicators that could be used to monitor the implementation of a forestry project. The appropriate indicators for a specific project shall be selected according to the project context, major anticipated impacts and the cost of data collection and processing.

Component	Indicators
Economy	<ul style="list-style-type: none"><li>• Annual revenues and profits generated by the project compared to projected revenues and profits.</li><li>• Number of jobs created and occupied by men and women.</li><li>• Level of satisfaction of adversely affected men and women toward compensations and offered alternatives. (survey)</li></ul>
Information, education and communication	<ul style="list-style-type: none"><li>• Understanding of concepts and approaches related to tree production and management among trained men and women producers (survey).</li></ul>
Access to infrastructures and services	<ul style="list-style-type: none"><li>• Availability of tree plantation inputs as a function of the demand (quantity and timeliness).</li><li>• Adequacy of storage facilities to the demand (quantity and quality).</li><li>• Revenues from timber transportation taxes and allocation.</li></ul>

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<b>Component</b>	<b>Indicators</b>
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Environmental Monitoring cont...

<b>Environment</b>	
Air	<ul style="list-style-type: none"> <li>. Area where fire is used for site preparation.*</li> <li>. Timber trucks traffic.</li> </ul>
Water	<ul style="list-style-type: none"> <li>. Groundwater static level and refilling capacity.</li> <li>. Parameters of <i>WHO Guidelines for Drinking-water Quality</i> for evaluating the physico-chemical characteristics of underground water and surface water quality (upstream, on the site and downstream).</li> <li>. Quantity of water used compared to initial estimates.</li> <li>. Number of workers trained on the safe use of chemical products.*</li> </ul>
Soils	<ul style="list-style-type: none"> <li>. Volume of sedimentation downstream of the project site.</li> <li>. Concentration of organic compounds in sediments.</li> </ul>
Ecosystems	<ul style="list-style-type: none"> <li>. Area cleared along water bodies.</li> <li>. Area of cleared natural forest for the establishment of tree plantations.*</li> <li>. Proportion of total natural forest area. **</li> <li>. Annual harvested ecologically sensitive area.**</li> </ul>
Flora	<ul style="list-style-type: none"> <li>. Number of species used, indigenous and exotic.</li> <li>. Biomass per inhabitant.*</li> <li>. Annual harvested volume by species and proportion of the annual allowable cut. **</li> <li>. Rate of regeneration by species and tree size (diameter).**</li> </ul>
Natural and cultural heritage	<ul style="list-style-type: none"> <li>. Loss of cultural, religious and historical sites (area and/or quantity).</li> </ul>
<b>Population</b>	
Migration and resettlement	<ul style="list-style-type: none"> <li>. Adequacy of housing and basic services offered to workers.</li> </ul>
Natural resources and land management	<ul style="list-style-type: none"> <li>. Number of social conflicts requiring a legal or administrative intervention.</li> <li>. Number of and area affected by forest fires.</li> <li>. Changes in the availability of forest products by type on local markets and for collection before and after the project (quantity and quality).</li> <li>. Total area lost for crop production and livestock grazing.</li> </ul>
Quality of life	<ul style="list-style-type: none"> <li>. Level of satisfaction of men and women who had to change livelihood (survey).</li> </ul>
<b>Health Outcomes</b>	
Communicable diseases	<ul style="list-style-type: none"> <li>. Prevalence rates of malaria, sexually transmissible diseases and zoonoses.</li> <li>. Number of vector breeding sites and vector density.</li> <li>. Abundance of disease reservoir animal species.</li> <li>. Availability of condoms, impregnated bednets, mosquito repellents.</li> <li>. Outpatient attendance records.</li> <li>. Quantities of drug supplied and used from health services and local shops.</li> </ul>



## NOT FOR CITATION

Non-communicable  
diseases

- . Prevalence rates of poisoning.\*
- . Inventory of exposure sites including pesticide storage.

## NOT FOR CITATION

### Environmental Monitoring cont...

Malnutrition	<ul style="list-style-type: none"> <li>• Number of people affected by seasonal hunger (evolution over time).</li> <li>• Height/weight monitoring of children.</li> </ul>
Injuries	<ul style="list-style-type: none"> <li>• Number of violent events reported by the police and social services.</li> <li>• Number of accidents in forest worksites.</li> <li>• Police records of traffic accidents.</li> </ul>
<b>Gender</b>	
Division of labour	<ul style="list-style-type: none"> <li>• Time spent by women and children on forest products management and/or collection before and after the project.</li> </ul>
Income-generating activities	<ul style="list-style-type: none"> <li>• Proportion of revenues received and managed by men and women in families participating in the project (before and after the project).</li> </ul>
Access to and control over productive factors	<ul style="list-style-type: none"> <li>• Level of satisfaction of women toward project investment decisions and management methods (survey).</li> </ul>
Involvement in societal organisations	<ul style="list-style-type: none"> <li>• Proportion of women and men involved in forest management committees.</li> </ul>
<b>Participation</b>	
Consultation	<ul style="list-style-type: none"> <li>• Proportion of forest users (men and women) consulted as part of the project.</li> </ul>
Civil society strengthening	<ul style="list-style-type: none"> <li>• Increase in community-based organisations dedicated to forest management or environmental protection.</li> <li>• Rivalry cases among existing and new CSOs.</li> </ul>

\* Specific to tree plantations

\*\* Specific to natural forest management